

STRUCTURE S-140

This structure is a pumping station with a gated box culvert spillway which controls flows which bypass the pumps. The structure is located in the alignment of Levee 28 approximately 42 miles south of Clewiston on the east edge of the Seminole Indian Reservation, in Broward County, Florida. The pumping station consists of a reinforced concrete substructure and concrete block superstructure, containing (3) Fairbanks Morse Company 110-inch diameter vertical pumps, each rated at 435 c.f.s. and 4.1 ft. static head. Each pump unit is driven by a Detroit Diesel Model V1271, 485 HP diesel engine connected to the pump through a Model 3518 VBHX right angle gear reducer unit manufactured by the Philadelphia Gear Corporation. Electric power for this station is furnished by two 100 K.W. General Motors Detroit Diesels, Model 8V-71, heat exchanger cooled engine generator sets. A 10-ton manually operated overhead bridge crane is provided for general service and maintenance. Other station equipment includes a station service water system for washdown, a dewatering system for the intake bays for inspection and maintenance, and an electrically-operated trash rake hoist for removing debris from the intake bay trash racks.

PURPOSE

The purpose of the structure is to discharge excess drainage water from the Levee 28 borrow canal into Conservation Area No. 3, at the rate of 7/16 inch per day from the tributary drainage area. The station is designed to serve 110 square miles north and east of the interceptor canal and west of L-28.

OPERATION

The pumping station will be operated as necessary to maintain the water level at elevation 10.5 ft. in the area between Levee 28 and Levee Interceptor Canal, unless the water level in the conservation area is low enough to permit gravity discharge at a satisfactory rate through the adjacent spillway gate. The water surface should not be drawn down below el. 7.5 ft. at the pump intake. The pumping station has a total design capacity of not less than 1300 c.f.s. at any pool-to-pool head up through and including 4.1 feet; it will also deliver a reduced capacity at higher pool-to-pool heads up through and including 5.2 feet. The pumps should be started and stopped slowly, one pump at a time, in order to avoid high velocities and surges in the approach

canal. The Operation Chart defines the entire recommended range over which pumping can be accomplished. Inasmuch as the reduction ratio between engine and pump is fixed, all pump rotative speeds are expressed in terms of engine speeds as indicated on the engine tachometer. The rated speed is 1200 r.p.m. At this speed, each pump has a design capacity of 435 c.f.s. with a pool-to-pool head of 4.1 feet and intake pool gauge not lower than el. 7.5 feet. At heads exceeding 4.1 feet and operating at the same speed of 1200 r.p.m., the pump capacity decreases to a minimum of 394 c.f.s. at the maximum pool-to-pool head of 5.2 feet. No operation should be attempted at heads in excess of 5.2 feet nor should engine speeds be increased above 1200 r.p.m. During extended periods of operation, speed may be decreased in order to improve operating efficiency and fuel economy, although such operation will simultaneously result in a decrease in capacity.

If, during a pumping operation, the water surface on the intake bay falls below el. 7.5 feet, the speed of all pumps then operating should be reduced to not less than the minimum speed shown on the Operation Chart. If this does not restore the water surface in the intake pool to elevation 7.5, one or more of the pumping units should be shut down until the minimum pool elevation is re-established.

The pumps in this station are designed to pump drainage water containing a negligible amount of sediment or other material which might damage the surface of the pump or the bearings. All pump bearings are designed for grease lubrication and to exclude dirt and grit. However, the quantity of water being pumped by the station should be reduced at any time the water in the suction bay becomes moderately silted or if it appears that the approach velocities are carrying a bottom load of sand into the sump chambers.

The main pumping units at Station 140 are considered to be free from severe or harmful criticals through the speed range (800 to 1200) r.p.m.

FLOOD DISCHARGE CHARACTERISTICS

	Pump Design	Gravity Design
Discharge Rate	<u>1300</u> cfs	<u>300</u> cfs
	<u>*</u> % SPF	<u>*</u> % SPF
Headwater Elevation	<u>10.5</u> feet	<u>10.5</u> feet
Tailwater Elevation	<u>14.6</u> feet	<u>10.3</u> feet
Type Discharge	<u>Pumped</u>	<u>Uncontrolled submerged</u>

*Discharge not related to Standard Project Flood

DESCRIPTION OF STRUCTURE

Type Three pumping units and one gated box culvert spillway in a reinforced concrete and concrete block structure

Spillway

Number of barrels one

Size of barrels 16.0 feet wide by 11.0 feet high

Length of barrels 56.6 feet

Gate sill elevation 4.0 feet

Culvert Invert elevation 3.0 feet

Water Level which will by-pass structure 19.0 ft.

Clear gate opening 9.0 feet high by 16.0 feet wide

Gates

Number one

Type vertical lift

Size 9.33 ft. high by 16.75 feet wide

Control On-site manual and remote computer control

Lifting Mechanism direct drive electric motor gear connected to gate stem lifts

Maximum Gate Opening 7.0 feet

Dewatering Facilities

Storage Structure 8

Type stop logs

Size and Number

Upstream & Downstream 27 each, total,

14" x 14" x 17'-10" long

Pumping Station

Number of pumps 3

Size & Type of Pumps 110" vertical propeller

Design rating 435 cfs each

Impeller Speed 81.6 r.p.m.

Pump Manufacturer Fairbanks Morse

Engine Make & Type Detroit V-1271

Engine Horsepower 485 each

Engine Speed 1200 r.p.m.

Gates (per bay)

Number one

Location Downstream end of discharge tube

Type vertical lift with flap gates backflow prevention gate

Size 7.9 feet high by 23.25 feet wide

Lifting Mechanism Direct drive electric motor gear
connected to gate stems

Dewatering Facilities (per bay)

Storage On-site

Type Steel bulkheads

Size & Number

Number 4

Width 1'-6"

Height 3'-8½"

Length 25'-8"

ACCESS via about 1500 feet access road from Everglades Parkway

POWER SOURCE Diesel engine driven electric generator

HYDRAULIC AND HYDROLOGIC MEASUREMENTS

Water Level On-site, analog and remote digital headmeter & tailwater recorder

Gate Position Recorder On-site analog and remote digital recorder

Rain Gauge Remote digital recorder

Engine Tachometer Remote digital recorder

Wind Speed and Direction Remote